LOUGH ERNE DRAINAGE.

RETURN to an Order of the Honourable The House of Commons, dated 30 June 1853;—*for*,

COPY "of the REPORT of the Board of Works in *Ireland* upon the Plan submitted to the Board by the County Surveyor of *Fermanagh*, relative to the FLOOD DRAINAGE and NAVIGATION of *Lough Erne*, and the WORKS connected therewith."

RIVER DRAINAGE.

Office of Public Works, Dublin,
2 June 1853.

Sir,

IN compliance with the instructions of the Lords Commissioners of Her Majesty's Treasury, conveyed in your letter of the 14th of April last, I beg to transmit herewith copy of a Report by Mr. Barry D. Gibbons, on the Lough Erne Works, as proposed by Mr. Roderick Gray, the surveyor of the county of Fermanagh.

I am directed by the Commissioners to state, for the information of their Lordships, that the Board selected Mr. Gibbons to make this Report from full confidence in his abilities, and his not being in any way mixed up with the project for the improvement of the drainage and navigation of Lough Erne, made under the Board's directions.

The Board have to express their own concurrence generally in the opinions expressed by Mr. Gibbons in his report.

I have, &c.
(signed) *E. Hornsby*,
Secretary.

Sir Charles E. Trevelyan, K.C.B. &c.,
Treasury.

PUBLIC WORKS.

IMPROVEMENT of *Lough Erne*, with a View to Navigation and Drainage.

IN compliance with the Board's orders that, after perusing the documents which I was sent connected with this subject, and examining the principal places, such as Belleek, Portora, the Enniskillen Passes, &c., I should state my opinion on the project generally, and upon the designs put forward for effecting the objects in view, I have the honour to submit the following observations:—

In every case, as in this, drainage and navigation are more or less antagonistic; but, after the best consideration I can give this project, I am satisfied there is no reasonable grounds to doubt that, if a moderately comprehensive design be acted on, these objects can be reconciled and both fully and permanently effected.

The circumstances and form of the barrier at Belleek put the levels of both lakes under the control of a regulating weir, and sufficient sluices at that point; provided we enlarge the capacity of the narrows and shallows leading to this outlet, and connecting the upper with the lower lake, to such extent as that a "head," incompatible with efficient drainage, shall not be required to force the floods through these passes. The data, collected by Mr. Forsyth and by Mr. Thomas Mulvany, are so ample, and, I have no doubt, trustworthy, that the extent to which these enlargements should be made is susceptible of calculation with a sufficiently close approximation to rigid accuracy for all practical purposes. I do not aim at what is unattainable within reasonable cost, namely, an uniform level of both lakes, but that the range should be limited to what would be sufficient for navigation, and not injurious to the low lands; and I have no hesitation in saying, that the accomplishment of this may be reduced to a physical certainty.

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The designs before me are one by Mr. Forsyth, and two by Mr. Gray. In the principles of Mr. Forsyth's scheme I generally concur. I do not quite approve the kind of sluices which he proposes for Belleck, and I am of opinion that the balance gates, lock, &c., at Knock Island may be dispensed with without injury to the navigation, and with decided advantage to the drainage; but after an anxious investigation of the whole design, it is my deliberate conviction that the modification of it, as described in Mr. Thomas Mulvany's paper, is fully adequate to so control the floods in both lakes, as that, while there would be sufficient depth in summer for navigation, (say 5′ to 6′ minimum), the surface in winter would be limited to a range not exceeding 2′ 6″ under any circumstances. This opinion is founded upon the data before alluded to, and on which I place reliance.

The next, and the important point, is the estimated cost; and assuming the correctness of the data as before, and taking into account the saving by omitting the lock, &c. &c. at Knock, against any extra sinking that may prove necessary, I should have no apprehension of the estimate put forward being exceeded. The prices are moderate, but the quantities are large, and will therefore bear the cost of preparation.

The sum proposed to be expended is very serious in amount; and though the vast extent of flooded land, appearing in every direction, would seem to a cursory observer to leave no doubt of the prudence and good policy of the measure, in a commercial point of view, yet the resident landowners must be the best judges whether the improvement and security from frequent damage by flood that it would unquestionably afford, would be an adequate return for the charge it would occasion. As to navigation, I must confess that its value, present or prospective, appears to me to be greatly overrated; the existing trade is insignificant, nor do I see any likelihood of increase. Enniskillen will very shortly have railway communication to Belfast, and the east seaboard, and to Londonderry, and most probably to the port of Sligo, in the opposite direction; and the head of the lake will be approached by the M. G. Western Branch at Cavan. With these in view, I do not see anything to justify much expenditure on the navigation of Lough Erne or its tributaries. The drainage of such a large extent is most important in other respects besides the direct return, and it fortunately happens, in this case, that at almost every point the operations indispensable to efficient drainage would give depth for navigation; it being cheaper to obtain the necessary sectional capacity in depth than in width, except when the sinking is in material that cannot be dredged, such as rock *in situ*, as at Portora; and here it is cheaper owing to the abruptness of the sides.

I shall now proceed to Mr. Gray's design, which professes to provide for both navigation and drainage.

He proposes to omit all sluices at Belleck, and to trust entirely to converting the natural barrier into a regulating weir, leaving any gaps that may be in it untouched. The result must be, that in low summer water the surface of the lower lake would be reduced below what would be at all desirable for the navigation of the bays; while, in times of flood, the depth required (2′ 6″ to 3′) to pass the calculated quantity of water over this length of barrier, added to the amount of the indispensable inclination of the surface between Belleck and Roscor, would leave the surface level of the lower lake, in floods, very nearly as high as ever; whereas, if ample sluices be inserted in a well-constructed regulating weir, the water may be kept up in summer to the desirable level, and on the very first indication of rising beyond this, the sluices may at once be brought into powerful operation, and the rise limited to to a very harmless range. For this great purpose, I prefer manuduction of the sluices to any attempt at self-action, as more simple, more certain, and capable of great effect, even before the flood had reached them. Thus would the level of the lower lake be at your discretion. The object would be always worth the manual labour and attention it would take.

What Mr. Gray proposes at Portora would, in my opinion, be sufficient; namely, a channel 8′ below summer level, for the whole width from bank to bank.

With regard to the work proposed immediately at Enniskillen—to shut up one of the channels which carries about one-third of the whole quantity—there may be extraneous reasons connected with the improvement of the town that would justify this; but the increased expense should be charged to that object. However,

ever, as regards the efficiency of discharge, it matters little in this case whether the required capacity be had in one channel or in two.

Mr. Gray seems to attach great value to producing increased velocity in the waters of the upper lake, and with this view proposes to embank extensively, and to introduce self-acting sluices to relieve the lands within these embankments. It is evident that the more the area of the upper lake be curtailed, the higher will its surface be raised (it continuing to be the recipient of the same catchment), and the more rapid will rising take place; and this velocity, which Mr. Gray seems to desire, can only be had by difference of surface level. Now, the chief aim of all our efforts and designs is to prevent this rising of the surface, and to diminish this difference of level to the minimum that is requisite to pass the flooded waters, while these propositions of Mr. Gray's have a direct tendency to aggravate these evils. Valve sluices are chiefly applicable where the waters rise and subside within short intervals, such as tidal waters; the lands within these embankments must necessarily be flooded, and as these sluices cannot act at all until the outside waters fall below the level of the inner, it follows that these lands must remain longer under water than if there were no banks or sluices.

The proposed diversion of the Sillies River, as described by Mr. Gray, would be beneficial, and if it could be done for the value it would be advisable; but of this, in the absence of measurements of any kind, I can form no opinion. The physical circumstances must be favourable indeed, to keep the expense within what it would be worth.

It is unnecessary under the present circumstances of "funds available," and of trade, to enter into consideration of the project to substitute a new cut at Ring (involving, it appears, excavation to the extent of over 200,000 cubic yards), in lieu of an existing channel, 400 feet wide and 15 feet deep at the least, for the mere purpose of shortening the sailing course 1½ mile.

The alterations proposed in the courses of the Swanlinbar and Colebrook Rivers are, as far as I can form an opinion from the maps and charts, objectionable. It is most desirable that such tributaries should meet the lake where it has great capacity in width and depth, and not (as proposed) at the narrow channels where they will aggravate every difficulty, and increase obstruction as regards drainage and navigation.

It appears to me that Mr. Gray's mode of dealing with this case is founded throughout on an erroneous principle, in seeking to get rid of the flood waters of the upper lake by increased velocity, instead of by an increased capacity of the channels. As I before stated, this accelerated velocity necessarily implies increased difference of surface level, which is the very reverse of what we want to attain, in order to combine drainage and navigation.

He also seeks to bring the waters of the remote districts as rapidly, and as early as possible, to the pass between the lakes, instead of allowing them to expand over the largest attainable area of lake and river surface. The obvious result must be a higher surface, and an aggravation of the difference of level of the two lakes.

In concluding this portion of the subject, I am bound, with every respect for Mr. Gray, to declare my conviction that if his plan of operations were carried out to the full extent, as he describes it, the flooded lands would still remain unrelieved and unprotected to any appreciable extent. I may safely go further, and say, that if his principle of contracting the lake surface were acted upon at all extensively, the damage to the low lands would be materially increased instead of prevented.

Under these impressions, it may be unnecessary for me to make any remark upon the cost of the proposed works, which is set down at a round sum of 50,000*l.* Considering what a diffused, extensive, critical work would have to be completed, and finding this sum of 50,000*l.* arrived at without survey or measurement, section or calculation, I trust I shall be excused for saying that I can place no confidence in it.

It only remains to me now to offer a few remarks on the minor project put forward by Mr. Gray.

It is not pretended, and it would be a delusion to represent, that this would confer any substantial benefit on the flooded lands; it should be considered solely with reference to navigation, and there can be no doubt that every shoal cut through, or obstruction removed, will afford increased facility to the passage of the cots and boats.

The estimate for a channel from Belturbet to Belleek 100′ wide, and 6′ under low summer water, is 9,786 *l.* With reference to this estimate I beg to observe, that the rates or prices are high; but the quantities being very small will not bear the cost of preparation. Take, for instance, Portora Shoal: 3 *s.* per cubic yard appears a very large price; but the sum total is only 600 *l.*, a very large portion of which would be gone before one yard of rock *in situ* could be taken out of a narrow channel, six feet under the low summer level of Lough Erne.

Mr. Gray gives no sections, and I am therefore precluded from testing his quantities; but applying, as well as I could, his design (as described) to Mr. Forsyth's sections, I could not find that the removal of the quantities he sets down would produce a navigable channel, 100 feet wide, and 6 feet deep, from Belleek to Belturbet. But assuming that the sum named is approximately sufficient for the work, then the main question appears to be, is the promised benefit worth the cost? It is an error to say that this expenditure would tell in executing the large design hereafter. Every practical man will see that it would be value but for a small portion of it; and my unqualified opinion is, that (entirely disregarding from what source the funds may be procured) it would be a very injudicious application of any such sum as 9,786 *l.* to expend it in producing the very partial improvement promised by this scheme to the inconsiderable traffic on Lough Erne. The project should be carried out so as to embrace the really valuable object (drainage), or not at all. But if still it should be determined to expend a limited sum, my recommendation is, that putting aside, as we well may, any expectation of benefit to the lands, the operations should be directed solely to the removal of obstructions to the passage of the boats; and in furtherance of this view of the case, I would omit altogether any work at and between Roscor and Belleek. The partial improvement of these few miles at the end of the lake is surely not worth 4,800 *l.*, the sum which Mr. Gray proposes to expend here; and as the works proposed here would be useless as regards drainage, and unnecessary for the improvement of the remainder of the navigation, Mr. Gray's estimate may be reduced to 4,986 *l.*

		£.
		9,786
Less - - - - -	£. 4,000	
10 per cent. - - - -	- 400	
Eelweirs - - - - -	- 400	
		4,800
	£.	4,986

And still further reduced by making the width 60 (instead of 100) feet, which would be quite sufficient for the passage of boats, and would not so injuriously run down the low summer water.

(signed) *Barry D. Gibbons.*

Harbour Engineer's Office,
21 May 1853.

LOUGH ERNE DRAINAGE.

COPY of the REPORT of the Board of Works in *Ireland* upon the Plan submitted to the Board by the County Surveyor of *Fermanagh*, relative to the FLOOD DRAINAGE and NAVIGATION of *Lough Erne*, and the WORKS connected therewith.

(Mr. Conolly.)

Ordered, by The House of Commons, *to be Printed,*
30 *June* 1853.

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